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*Research and Adjustment March Together:* HENRY A. WALLACE ..... 105

*Work of the American Museum of Natural History:* FREDERICK TRUBEE DAVISON ..... 106

*Obituary:*  
*Nathaniel Lord Britton:* DR. HENRY H. RUSBY.  
*Recent Deaths* ..... 108

*Scientific Events:*  
*The Radcliffe Observatory; The New York Post-Graduate Medical School; Dedication of the Mountain Lake Biological Station; Honorary Degrees at the University of Wisconsin* ..... 111

*Scientific Notes and News* ..... 114

*Discussion:*  
*How Some Birds Satisfy Thirst:* H. A. ALLARD.  
*Selenite not a Certain Indicator of Wind Effect:* WALTER B. LANG. *On a Whale Skeleton in the Collections of the California Academy of Sciences:* M. E. DAVIDSON. *A New Mammoth Record for Illinois:* FRANK C. BAKER ..... 116

*The Fifteenth Annual Meeting of the American Geophysical Union:* DR. JNO. A. FLEMING ..... 119

*Scientific Apparatus and Laboratory Methods:*  
*A Simple Agitator for Submerged Respirometers:* DR. H. SPECHT. *A Stain for Difficult Plant Material:* PALMER STOCKWELL. *Micro Mounts, Reverse and Converse:* PROFESSOR ARTHUR PAUL JACOT ..... 121

*Special Articles:*  
*Spontaneous Encephalomyelitis of Mice—A New Virus Disease:* MAX THEILER. *Respiratory Types and Photoperiodism:* PROFESSOR R. H. ROBERTS and JAMES E. KRAUS. *Linear and Dendritic Sink-hole Patterns in Southeastern New Mexico:* DR. FRANK A. MELTON ..... 122

*Science News* ..... 8

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## RESEARCH AND ADJUSTMENT MARCH TOGETHER

By HENRY A. WALLACE

SECRETARY OF AGRICULTURE

THERE is supposed to be a conflict between agricultural science and the need to adjust agricultural production. Agricultural science enables farmers to increase crop yields per acre and increase the output of meat and milk per unit of feed consumed. As the users of agricultural improvements increase in number, output increases until prices fall. How can all this be reconciled with the need to make supply and demand balance?

This is an old puzzle, but often solved. Again and again people bring it forward as if the solution were unknown. With an air of drawing attention to an unperceived anomaly, a newspaper writer recently declared himself amazed that the technical branches of the U. S. Department of Agriculture should oper-

ate at full blast to perfect crop and livestock production, while the Adjustment Administration labored simultaneously to cut down the production of cotton, wheat, corn, hogs, tobacco and other products. Here, he said, we have futility on a scale worthy of a Greek tragedy.

What would happen were farmers to abandon science or even to use it with greatly decreased efficiency? They would have to continue plowing, sowing and reaping. But they would use poor machinery, poor technique and poor seed. They would allow pests and diseases to ravage their crops and would harvest inefficiently what remained. By so doing, they would certainly reduce the output. But they would do so at a cost ruinous to themselves. They

would increase their unit costs of production out of all proportion to any conceivable gain in prices.

From their beginnings, the U. S. Department of Agriculture, the state experiment stations and state extension services have promoted efficiency on the farm. Efficiency in the old sense of the word, however, is not enough. As farmers well know, profits can not be got just by improving plants and livestock, by fighting diseases and pests or by reducing the wastes of marketing. Ordinary technical efficiency reduces only the cost of production. Low-cost production may mean loss to the farmer if it is excessive production. Under present conditions it is necessary also to adjust the output to a changed world market.

Low cost per unit of production, when total production has been adjusted to effective demand, directly increases the farmers' net income. There is a definite limit to the volume of farm goods which can be disposed of under existing domestic and export consumption demands, at a price returning a fair income to the farmer. When this limit is reached, the only sound economic way in which the farmer can increase his actual income is by utilizing the efficient technique of production which lowers his unit cost and leaves him a greater share of the market price which he gets for his goods.

Action taken under the Agricultural Adjustment Act of 1933 enables farmers to plan their production. It seeks to transform blind competition into broad-visioned cooperation and to correct the result of previous mistakes. Meantime scientists continue their research in various problems of farm production. These two kinds of departmental activity must march together.

Agriculture needs not less science in its production but more science in its economic life. It is possible to have a full science, embracing the distribution as well as the production of wealth.

In the last year our farmers have taken their first steps toward matching efficiency in production with

efficiency in economic adjustment. As they proceed along this path they will realize that the more they have of the one type of efficiency, the easier they will find it to achieve the other. The reason is plain. Efficient production is more dependable and therefore more easily controlled than inefficient production. By emphasizing economic and technical problems equally, and by indicating their interdependence, the department advances upon a logical path, in which its various activities are wholly consistent one with another.

We might just as well command the sun to stand still as to say that science should take a holiday. Science has turned scarcity into plenty. Merely because it has served us well is no reason why we should charge science with the responsibility for our failure to apportion production to need and to distribute the fruits of plenty equitably. That failure we must charge squarely to organized society and to government. We need economic machinery corresponding to our scientific machinery in precision, in power and in delicacy of adjustment. Science has done the first job, and done it magnificently. It has shown us how to produce. Now it must show us how to distribute what we produce. It must go forward and not back. To production science we must add economic science, without for a moment ceasing to advance the former. Because we have surpluses of certain things does not mean that we have too much wealth or too much power to produce wealth. To suppose that we have is to imply that man would be better off without means to make nature do his will.

To produce efficiently is to release time and energy for other uses, adding to the enrichment of life. Not to produce as efficiently as possible would be silly. Not to regulate the total volume of production, to relate it to consumptive demand, also would be silly. No factory is expected to fail, even when producing at less than capacity, to take advantage of new efficiencies. The same reasoning applies to agriculture.

## WORK OF THE AMERICAN MUSEUM OF NATURAL HISTORY<sup>1</sup>

By President FREDERICK TRUBEE DAVISON

My first year in the president's office, and entering upon its duties as a layman, have given me some very decided impressions. No one who has the privilege of measuring the influence of the museum at the present time could fail to be filled with admiration at the great accomplishments of my distinguished predecessor, Professor Henry Fairfield Osborn, who for twenty-five years exerted outstanding qualities of leadership in the scientific and educational worlds.

<sup>1</sup> Sixty-fifth annual report to the trustees.

His work was not confined to purely scientific or educational activities, but carried with it a great spiritual force which has left a real mark not only on the city, but on the entire nation.

Under his guidance, the museum has established a fundamentally sound policy in accomplishing its mission, which falls into two general parts—first, scientific, and second, educational. Professor Osborn gathered around him a group of men and women, each holding a fine position in his or her particular

field of scientific activity, which has given the institution a high place the world over. Their work is the keystone of the museum's usefulness. Without it, progress and continuing influence would be impossible. That work must be extended and expanded.

In my effort to obtain a conception of the range of their activities, I have been greatly impressed at the extent of their work. Their research covers practically the whole field of natural science, from astronomy to microscopic organisms, but all directed in a field of legitimate museum operation, and with an eye not alone to pure science but in an effort to make simple and attractive to the layman, child and adult alike the mysteries of nature.

That the educational value of the museum is becoming increasingly appreciated is evident from the figures showing how many people came in direct contact with the institution. In 1933 we had 1,102,096 visitors within our halls. At the same time, direct contacts were made with over 31,000,000 school children, in addition to the large number of individuals and institutions reached by our magazine, *Natural History*, and our scientific publications.

In times of financial distress, when so many of our citizens are turning to institutions of this character during their leisure hours, it is of the utmost importance that we develop our scientific work, on the one hand, and extend our educational work on the other, in order that the former may become available, not alone to the comparatively restricted scientific world, but to the public as a whole.

In addition to the ordinary activities of the museum, its facilities have been made available, to the limits of its resources, to various programs for the unemployed.

In spite of a substantial reduction in appropriations made to the museum by the city and the corresponding shrinkage in our endowment income, there have been several notable contributions during the past year, made possible by the public-spirited interest of a number of individuals, together with a very evident desire on the part of the city administration and the Federal Government to cooperate in our educational program to the extent possible under present conditions.

In 1929, the late Mr. Harry Payne Whitney offered to give \$750,000 for the construction of the South Oceanic Bird Wing, on condition that the city would provide a like amount of money. This gift was accepted by the city, but in view of the fact that the financial situation was such that no more funds could be appropriated or bonds sold in the regular routine, the city in 1933 was still a quarter of a million dollars short of its pledge. The trustees of the museum offered to purchase at par \$250,000 of city bonds in order to provide the necessary funds for the city to

carry out its obligation to the Whitney estate, which offer was readily accepted by the city. Consequently, at the present time, completion of that great project, made possible by Mr. Whitney's generosity and that of his family, is definitely assured, and the Rothschild collection, presented to the museum by Mrs. Whitney and which still lies unpacked, will soon find a proper final resting place and be available to scientists the world over for scientific purposes.

Mr. Charles Hayden and the Reconstruction Finance Corporation have made it possible for us to realize one of the important objectives laid down by the trustees several years ago, of having a planetarium. Mr. Hayden very generously provided sufficient funds to purchase a Zeiss Projection Planetarium, together with a Copernican Planetarium, the Federal Government agreeing to purchase bonds for the construction of the building, the whole to be known as the Hayden Planetarium. The state and city governments cooperated in this project, thus assuring the people of New York one of the most dramatic and fascinating aids to education ever devised.

Exploration in many of its various forms is the very life-blood of progress in natural science, and in this modern age a new vehicle has entered that field and holds a position of fundamental importance—the airplane.

In all its history, the museum has given its enthusiastic support to sound exploration and is proud of the gifts which have been made of equipment used in all parts of the world on fruitful expeditions. A very notable addition to our exhibits has been made in this past year through the donation by Colonel and Mrs. Charles A. Lindbergh of the plane which they used in flying across the Arctic regions and the Pacific Ocean, and later in their exploration flights over Greenland, Iceland, the North Atlantic, Europe, the South Atlantic Ocean and South America. Probably no exploratory expeditions by air have ever been so well equipped as those conducted by Colonel and Mrs. Lindbergh, and their gifts to the museum are proving not alone of great interest but of real educational value.

One of the warmest friends the museum has ever had was the late Dr. I. Wyman Drummond, who, for some time prior to his death, was a member of our scientific staff and who had already made many gifts to our collections. Shortly after Dr. Drummond's death, his sister, Mrs. William Herbert, very generously presented to the museum Dr. Drummond's magnificent collection of carved ivories, jade and amber. There probably is no finer collection of its kind anywhere in the world, and the trustees are profoundly grateful to Mrs. Herbert and her family for making this collection available to the public

through the American Museum of Natural History. It is a fitting memorial to Dr. Drummond's great work in the field of his particular interest and his devotion to this institution.

These notable additions to the museum have been accompanied by many others of great importance, too numerous to mention in a report which must be brief in the interest of economy. The director will enlarge somewhat on this subject in his report.

The museum, like every other organization in the country, has been pinched by the financial depression. Our problem has been and will continue to be for some time to come one of fulfilling our duty to the public and at the same time of making both ends meet. As a result of the decrease in city appropriations, we have been obliged to close ten halls daily and to curtail our work in every possible direction.

The question was raised as to the advisability of instituting pay days. After careful consideration it was decided not to do this. The trustees felt that every conceivable effort should be made to keep our doors open "free every day in the year."

That the year 1933 was ended with a balanced budget was made possible by the loyalty and generosity of all the employees who cheerfully made a substantial contribution out of their own pockets to that end. They are continuing to do that during the present fiscal year, and I want them to know that their interest and efforts are deeply appreciated. After all, they are the ones who make the wheels go round, and to have made sacrifices in these times as they have done for the work to which they are devoting their lives is high tribute to their loyalty.

During the coming months, the work of the museum must go on with increased vigor and within our financial limitations. Its influence can and should be broadened on a national scale. The demands are heavier than ever before in our history. More people than ever are turning to us for assistance, particularly along educational lines. The future presents a challenge which is stimulating and which must be met. I am confident that it will be met through the joint effort of the trustees, our entire staff, our members and our friends throughout the country.

## OBITUARY

### NATHANIEL LORD BRITTON

THIS learned and productive scientist, whose death occurred on June 25, in his seventy-fifth year, was in all respects a son of the state and city in which he lived and died. Born and bred in Staten Island, of local ancestry, his early life and interests, which even in childhood were directed toward nature loving and studying, were closely bound up with the life of that island and have left their eternal imprint on the scientific and educational character of its community.

While the scientific world will be content to read and refer to his published works, we, who knew him more intimately, may do well to look behind the work and consider the conditions under which it was performed and the manner of its doing and form an estimate of the character and life of the man.

Professionally educated at Columbia, he became connected with it as instructor immediately upon his graduation, and the educational relationship thus established continued throughout life. Into the affiliation of Columbia's faculty with the scientific activities of the city, Dr. Britton entered most heartily and soon he became recognized as one of the dependable supporters of the work of several of these societies. He became active in the proceedings of both the Linnaean and Microscopical societies, but his special interest was in the academy and the Torrey Botanical Club, the successful development of both of which has been largely due to his service and influence, at the same time that he was equally active

in the work of the now flourishing Natural History Association of Staten Island. His later connection with the Botanical Garden, a city institution, brought him into close relations with the city government, so that he became associated with many of those who have conducted its political and financial affairs for a third of a century. Thus, while the many interests in this and foreign countries which have profited by his labors will feel his loss as a scientist, our city will also miss him as an active and distinguished citizen.

If asked to specify the strongest feature of Dr. Britton's work, I should refer to the thoroughness and practicality of his studies and views. He seemed to absorb the essence of everything that he studied and to possess the rare ability to turn it to immediate use. Attracted one day by the beauty of some drawings that lay before him, I inquired as to their source, and when told that he was himself the artist, I asked in astonishment, "Why—can you draw like that?"

"Of course," said he, "what do you suppose I did all that hard work in the drawing class for?"

I recall another day when very important blasting and clearing work on the Garden grounds, involving many workmen, was threatened with blockade because of the failure of the man who was running the steam drill. On being told of the situation, what did our director do but get busy with that drill, handling it with efficiency for several hours, until the situation could be adjusted.

Known so widely and so well for his botanical work, there is danger of the fact being overlooked that Dr. Britton was primarily a geologist, and that he originally took up the subject of botany as an adjunct to that science. New York will remember him best as the founder of its great Botanical Garden, "great" both individually and comparatively, but Columbia should think of him chiefly as the founder of its department of botany, and should cherish the memory of the manner in which he organized and carried out that procedure. Appointed as an instructor in geology under Professor Newberry, he was quick to see the urgent need of a botanical department, even if conducted solely as a geological auxiliary. He found stored in an attic and loaded with the dust of decades the bundles of the old Le Roy Herbarium and, with the permission of his chief, began devoting his spare hours to arranging it for use. His difficulties may be inferred from the fact that he could not secure lighting facilities for his work, which he was obliged to drop upon the approach of darkness. It was my pleasure to assist him at times with this work, and I recall an occasion when President Seth Low, accidentally wandering into that dusty attic, observed us at work. Surprised, he looked on for a moment and then said, "Very well, if it means anything to you, by all means keep on with it."

And so the doctor did "keep on," grubbing silently and persistently, scarcely any one realizing his ambitious intentions, and sensing only a sort of eccentric fad in his handling of those old specimens. I have always believed, however, that Professor Newberry was a confidant in and a party to his plans. There came a time when he was able to hand over to the university the very creditable nucleus of a general herbarium, the possession of which was not long in leading to the establishment of a genuine botanical department, now a world power in the development of that science.

In very much the same way, the Torrey Botanical Club and the New York Botanical Garden were established, although here Dr. Britton was only one of an enthusiastic group, and here also he had the indispensable cooperation of Mrs. Britton. The directory of people then interested in botanical work in this country, for the most part merely in the collection and naming of specimens, could be printed on two or three small pages and a large part of them were gathered into the membership of the Torrey Club.

Often the attendance at the meetings was too small for formal proceedings, and a few of us would gather about the old pot-stove in Professor Newberry's room for an informal talk. As far back as I can remember, these conversations would invariably turn to the sub-

ject of a possible botanical garden in this city, the old Hosack Garden serving as our text. The club's bulletin, started in 1901, was a four-page publication, and the numbers ended with the last word that could be accommodated on the fourth page, sometimes only a part of a word. All this club work had been started before Dr. Britton's appearance on the scene and was being regularly carried on when he and Mrs. Britton became members, but almost immediately, both of them became leaders, and from that time on more and more of the work and responsibility came to devolve upon them, so that they figure very largely in the development of the organization. The field meetings constituted an important, and perhaps the most highly appreciated work of the club, and in it the Brittons were specially active. It was at one of these meetings that I had my first and highly memorable meeting with the doctor. Dr. George Thurber, then president of the club, had informed me that the next field meeting was scheduled for the banks of the Passaic River, near the Avondale bridge not far from my home and, although not suspected by me at the time, close to the house where the schoolgirl was living who was subsequently to become my wife. Dr. Britton, though I think not the guide on that occasion, obviously dominated the party, and he at once attracted me like a magnet. His first questions, relating to the flora of the vicinity, with which I was well acquainted, were so incisive and pertinent that I at once recognized him as a master mind, and the silent allegiance that day formed was never broken, and can not be so, even by death.

Some of Dr. Britton's works, of minor importance from the world's standpoint, are of surpassing interest from our point of view, because of their influence in the development of this man of science. His first piece of work was, I believe, his catalogue of the plants of New Jersey, his doctoral thesis. Here again we note the geological connection, for this catalogue was published as a contribution from the New Jersey State Department of Geology. Here, also, we have our first opportunity of estimating the characteristics of our author's scientific work. It represented a great amount of critical labor, both field and literary, and this was performed with painstaking accuracy. It was my privilege to contribute rather largely to this work, because of my familiarity with the flora of my native state. Together we tramped from Port Jervis to the Delaware Water Gap, investigating the geographical limits of our plants, and together we slept out among the hills of Succasunna, but I was disappointed in my hopes of exploring the pine barren regions with him. An arrangement for a hike from Atsion to Tuckerton fell through and I had to make the journey alone.

The doctor's next important work was his "Flora of the Northeastern States." We had planned such a work together, in which the analytical keys were to be so constructed as to permit determination by either the flowering or fruiting specimen alone, but my duties made my participation impossible. It was the success of this work that suggested to Judge Addison Brown the idea of the 3-volume illustrated flora that Dr. Britton and he next undertook. It was the judge's expectation to meet with a heavy loss in this publication. He asked my opinion as to whether that loss was likely to exceed \$25,000, as he felt that he could not afford more. When I insisted that the work would yield a profit, he seemed rather shocked by my temerity, yet it proved so successful that Dr. Britton's royalties paid for his home in Bronx Park.

For similar reasons, Dr. Britton's enumeration of my South American collections of 1885 to 1887 proved of exceptional importance, as it was the beginning in this country of a systematic study of the South American flora that has since attained great importance. It was this work that first took the doctor to Europe, where his scholarly methods were at once recognized and where he is as well and favorably known and his work is as carefully studied, as at home. It was the undertaking of the "Illustrated Flora" that cut short Dr. Britton's study of these collections and compelled me to essay the completion of that work.

Dr. Britton's accomplishment in the establishment of our Botanical Garden is not likely to fail of appreciation by future generations, but they might easily fail to appreciate the difficulties attending such a vast work on such insufficient resources. Looking back upon the conditions that confronted the enterprise, they seem appalling, and the undertaking hopeless, yet—here is the garden, just pride of a nation! None of the enthusiastic botanical band, with the exception of Judge Brown, possessed enough means to justify even the starting of a subscription list, and but a very few of them had wealthy associates who might become interested. Again it was Dr. Britton who succeeded in inducing those few to initiate a campaign for funds. For years, the attempt persisted, but the work lagged and it was not until a determined group of women, led by Mrs. Britton, took to the warpath, that the minimum endowment of \$250,000 was secured, and of this, only the income might be used. Money for grading, road, path and bridge building, the location of lakes and the erection of buildings and conservatories, had still to be secured from the city administration.

The directorship was not sought by Dr. Britton! His appointment was a genuine act of selection, based on most practical considerations, and he was intro-

duced to his truly herculean task. His knowledge of geology and soil conditions, not less than his engineering ability, supported his work of landscaping and preparing the grounds, but more important than all was his genius in the use of his funds. Often it has been said that during those early years "every dollar of the garden's funds was made to do the work of four." It is not generally known that it was appreciation of these financial accomplishments that later led Mr. Carnegie to offer Dr. Britton an important and lucrative executive position in the United States Steel Corporation. All this time, it is to be remembered, the doctor was successfully building up his private fortune, from which he continuously and largely contributed at critical times in the garden's history.

This success, in carrying the garden through its lean early decades, could never have been accomplished but for the generous and self-denying support of as loyal a staff as has ever blessed any similar institution, and this devotion was in no small degree attributable to the director's personality.

Many persons, none too thoughtful, have been disposed to criticize the failure to have introduced more decorative features into the garden planning, but they overlook the fact that our grounds were destitute of protecting enclosure, and that theft and vandalism were rife. Large numbers of our finest plants were stolen, our flower beds were stripped, the tops were cut from our coniferous evergreens and carted away to be sold as Christmas trees, and even our labels were gathered up to be sold in bulk for the value of the lead that they contained.

Important as has been the establishment and development of the Botanical Garden, it is by no means certain that this has taken first place in Dr. Britton's own estimate of his accomplishments. Several months before his death, and before his disease assumed its serious phase, I held extended interviews with him. Anxious to relieve his depression and to stimulate a renewed healthy interest in life, I reviewed the history of the garden, emphasized the greatness of his service in this connection and spoke of its universal recognition, whereupon he interrupted me with a mild suggestion concerning his work in the Caribbean, in Cuba, Bermuda, the Bahamas, the Virgin Islands and Puerto Rico, as well as his many publications relating to the flora of the South American mainland. As though thinking aloud, he adverted to his work on the North American Flora, and his monumental work on the Cactaceae, universally recognized, particularly in view of the difficulty of the subject, as among the greatest of botanical monographs. We spoke long of the building up of our herbarium and the remarkable accumulation of botanical works in our library.

As a taxonomist, Dr. Britton was distinctly a middle-of-the-road man in the matter of specific and generic delimitations. As to families, he leaned strongly towards segregation when strong and reasonably constant characters existed. He was extremely cautious and slow in reaching conclusions on such critical questions, but extremely fixed in his decision, once made. He was, moreover, unmoved by the extent and authority of the opposition, after being once convinced. In no other connection was this steadfastness to conviction so thoroughly exhibited as in the matter of principles and rules of nomenclature; perhaps it is more accurate to say "in the basing of rules on principle." He appeared to regard the history of taxonomy as a highly important part of the science, and believed that the foundations of this history should be expressed in the names. The truth as to publication, he believed, should be stated in the name, a thing that could not be done except by indicating priority. This, in spite of all ups and downs, lapses and subterfuges, he believed must at some time be accepted, and he preferred to work on that basis. Hence, when botanical taxonomists, by a large majority, adopted "Truth, Ltd." as their procedure, if not their slogan, he replied, "Truth, Absolute!" And thus took his place with the small minority who think more of accuracy than they do of convenience.

HENRY H. RUSBY

#### RECENT DEATHS

WILLIAM HASTINGS BASSETT, the newly elected president of the American Society for Testing Materials, died on July 21, at the age of sixty-six years. Mr. Bassett was metallurgical manager of the American Brass Company, Waterbury, Conn. He was a past-president of the American Institute of Mining and Metallurgical Engineers (1930) and a former director of the American Institute of Chemical Engineers.

GOODWIN DELOSS SWEZEY, professor emeritus of astronomy at the University of Nebraska, died on July 10, at the age of eighty-three years.

DR. HENRY ARNSTEIN, chemist and engineer of Philadelphia, died on July 24, at the age of forty-eight years.

DR. CHARLES AUBREY PARKER, orthopedic surgeon, for forty years on the staff of Rush Medical College, died on July 16. He was sixty-seven years old.

DR. JOSEPH BAXTER EMERSON, for fifty-two years an eye and ear specialist in New York and for forty years connected with the Manhattan Eye and Ear Hospital, died on July 24 at the age of eighty years.

DR. STEPHAN RICHARZ, professor of geology at the Fu-Jen University, Peiping, China, died on July 14. He was sixty years old.

DR. BENJAMIN W. HUNT died at his home in Eatonton, Georgia, on June 26, at the age of eighty-seven years. He was a banker by profession, but his reputation was made along agricultural and horticultural lines. He was a member of the Georgia State Academy of Science, past-president of the Georgia State Horticultural Society, and was at one time a member of the Board of Trustees of the Georgia Experiment Station. He was a leader in his community in the development of the dairy industry, and was in the forefront of the fight against contagious abortion and the eradication of the cattle tick. Dr. Hunt was an authority on hardy palms and in plant breeding, being the first man to artificially cross the mule fig in the South. He was awarded the honorary degree of doctor of science by the University of Georgia in 1922. In his death Georgia and the South lose a great factor for leadership, and the last link with Berckmans and early American horticulture is gone.—T. H. McH.

## SCIENTIFIC EVENTS

### THE RADCLIFFE OBSERVATORY

THE London *Times* reports that Mr. Justice Bennett has sanctioned in principle an application by the trustees of Dr. John Radcliffe (who died in 1714) for leave to proceed with a scheme by which £72,000 of the £100,000 obtained from the sale of the property on which Radcliffe Observatory, Oxford, stands will be applied in building, equipping and maintaining near Pretoria, South Africa, an astronomical observatory.

Mr. Justice Bennett, in giving judgment, said:

The testator left his residuary real and personal estate to certain named trustees to be paid and applied to such

charitable purposes as they in their discretion should think best.

In 1770, at the instance of the Savilian professor of astronomy in the University of Oxford, the trustees of the will obtained an order of the Court, made by the Lord Chancellor, to purchase, out of the testator's estate, a piece of land on which to build an observatory for reading lectures in astronomy and to furnish the building with the necessary instruments. In the first place they obtained a lease of some land for the purpose and erected the observatory on it. At the beginning of the nineteenth century an Act of Parliament was obtained enabling the trustees to buy the land from St. John's College, Oxford, and the land continued in their ownership until 1930. In that year the trustees entered into a

contract for the sale of the site for which Sir William Morris (now Lord Nuffield) had given £100,000. The trustees had to come to the Court for leave to carry the contract into effect.

On July 17, 1930, an order was made sanctioning the sale. By the order the applicants were given liberty to carry the contract into effect and the matter was referred to Chambers for a scheme with regard to the application of the purchase money to be settled.

The scheme was one by which the trustees sought to be allowed to accept the offer of the Municipality of Pretoria to give to them about 57 acres of land on the range of hills known as "Klapper Kop," about four miles from Pretoria, and that the trustees should apply a sum not exceeding £72,000 in laying out and building an astronomical observatory there, and in building residences suitable for a staff and in equipping the observatory with a 72-inch reflecting telescope and other necessary equipment. The balance of the fund was to be used for the maintenance of the observatory.

The University of Oxford had been given liberty to attend the proceedings and had opposed the scheme mainly on the ground that it brought about a complete severance between the university and the observatory. He (his Lordship) could, however, find nothing in the history of the observatory which had given the university any legal right in the matter, though he could understand the feeling of the university after having had this observatory in Oxford for so long.

It was quite obvious from the evidence that the trustees, as one would expect, had given the most careful attention to all the questions which had arisen when they sold the site, and he was satisfied, after having considered the evidence, that the proposals of the trustees were beyond criticism, if the fund was to be used to the best advantage in the interest of astronomy.

#### THE NEW YORK POST-GRADUATE MEDICAL SCHOOL

THE New York Post-Graduate Medical School, Columbia University, announces an intensive four weeks' course in tuberculosis for physicians, beginning on Monday, August 27. It is under the direction of Dr. George G. Ornstein.

The course has been planned with the idea of presenting the problem of pulmonary tuberculosis in its many phases, and in a simple and logical manner. With this end in view the hours have been so arranged that the laboratory and relatively few didactic hours are immediately followed by and are intimately connected with clinical sessions illustrating the various points involved. Throughout the course emphasis has been placed on actual case study. The matriculate will do most of the work himself on the hospital ward. For this purpose over 1,700 tuberculosis beds are available at Sea View Hospital. Practically every type of case of chronic pulmonary disease with the various complications is well represented.

A history of tuberculosis will be presented on the

first morning. The five following mornings will be spent in the department of pathology, where gross and microscopical pathology will be presented. By means of the wealth of material available for demonstration, the various type of tissue reaction will be shown, the question of the pathogenesis of tuberculosis discussed, and a firm groundwork established upon which the later clinical presentations will be based. The afternoons of the first week will be entirely clinical.

The mornings of the second week will be spent in the bacteriological laboratory and in the x-ray department. Various procedures of bacteriological technique will be presented to and practiced by the matriculate. Methods of staining and cultivation of tubercle bacilli, questions of immunology and various other related topics will be thoroughly studied. Following a discussion of the physiology of respiration and the problems of blood, and of gaseous interchange in respiratory disease, there will be presented a study of the principles of physical diagnosis. The afternoons of the second week will be given over to the clinical implications of the morning studies. There will be demonstrations of the various pathological types of tuberculosis with a correlation of the pathological and bacteriological principles and the clinical disease.

The third week of the seminar will be entirely clinical. The first three mornings will be devoted to important problems of metabolic disease, diabetes, Bright's disease, amyloid disease and the various nutritional states as seen in the hospital service. All these will be presented and discussed. The remainder of the third week will be given over largely to the complications of pulmonary tuberculosis: *e.g.*, tuberculosis of the larynx, pregnancy in tuberculosis, etc.

The fourth week will be devoted chiefly to the surgical treatment of tuberculosis. Pneumothorax (selection of cases, technique, duration of treatment, complications) will be discussed and demonstrated. Indications for the various types of operation, such as phrenic evulsion, thoracoplasty and apicolysis, will be considered. This will be followed by a morning in the operating room during which the various operations will be performed. Follow-up clinics of cases actually under treatment will be presented so that the matriculate may have the opportunity of evaluating the various procedures that have been demonstrated.

#### DEDICATION OF THE MOUNTAIN LAKE BIOLOGICAL STATION

THE buildings of the Mountain Lake Biological Station of the University of Virginia were formally dedicated on the afternoon of July 21 in the presence of representatives of many of the southern colleges. The station is one mile north of Mountain Lake in Giles

County, Virginia, at an elevation of approximately 4,000 feet, on the divide between the Mississippi and the Atlantic drainage areas. In the vicinity is a wide variety of biological conditions varying from peat bogs and cranberry swamps to the dry Allegheny Mountain tops, including mountain and lowland streams and the nearby Mountain Lake, said to be the only natural lake in the Southern mountains and one of the highest in the East.

The buildings are of a rustic type of construction, but provided with electric current and running water obtained by gravity from a spring above the station on Bear Cliff Mountain. These buildings include the John B. Laing Laboratory, containing four classrooms, an office, a library and four research rooms. There are also nine residential cottages, a dining-hall, two service buildings and garages. Good mountain roads connect the station with Newport, eight miles away on the main east and west highway into West Virginia and with Pembroke on the Norfolk and Western and Virginian railways. The post office is Mountain Lake, Virginia.

The number of graduate students in biology at the station for the first term is twenty-one and there are six investigators and four members of the teaching staff. The colleges represented are: University of Virginia, West Virginia University, University of Pennsylvania, University of Tennessee, University of Georgia, University of Alabama, Mississippi State College, Virginia Polytechnic Institute, College of William and Mary, Vanderbilt University, Hollins College, East Radford State Teachers College, Johns Hopkins University, Virginia Intermont, Hampden-Sydney and Roanoke College.

The dedication exercises were presided over by the director of the station, Dr. Ivey F. Lewis, who introduced the speakers. Invocation was offered by Rev. G. W. Daniel, pastor of the Presbyterian Church in East Radford, Virginia. Bruce D. Reynolds, professor at the University of Virginia, gave an account of the development of the station and was followed by Harvey L. Price, dean of agriculture at the Virginia Polytechnic Institute, who gave the principal address. Dean Price spoke of the need for a biological station in the Southern mountains for research and instruction and offered in the name of the colleges of Virginia to cooperate in the development of the work at Mountain Lake. He also suggested the development of research on the diseases of game birds and fish in cooperation with the State Department of Conservation.

The exercises were attended by about 200 people from Virginia and the neighboring states. It was planned to take the visitors to Butt Mountain to show them the view from the fire tower and on to the Cascades for a picnic supper, but bad weather prevented the trip.

The construction of the buildings was made possible by the gift of 82 acres of land by Mr. John B. Laing, of Lewisburg, W. Va., and by a grant from the General Education Board. The station is expected to serve the Southern states, but is open to students from other sections. The teaching staff includes: I. F. Lewis and B. D. Reynolds, of the University of Virginia; Conway Zirkle, of the University of Pennsylvania; R. L. Taylor, of the College of William and Mary; H. L. Blomquist, of Duke University, and E. B. Powers, of the University of Tennessee.

#### HONORARY DEGREES AT THE UNIVERSITY OF WISCONSIN

IN conferring at the recent commencement exercises the doctorate of laws of the University of Wisconsin on Dr. Karl Taylor Compton, president of the Massachusetts Institute of Technology, and on Dr. Albert Russell Mann, provost of Cornell University, the citations made by President Glenn Frank were as follows:

##### KARL TAYLOR COMPTON

*Because:* You have brought to the field of physical investigation a productive eminence, marked by breadth of knowledge, ingenuity in experimentation and lucidity of exposition.

*Because:* Your research in pure science reflects a rare union of precision and originality of mind, and your research in applied science reveals the imaginative power of inventive genius.

*Because:* Your brave innocence of belief that a man can concurrently serve at the altar of productive scholarship and carry the distracting obligations of the administrator has, in your case, been justified.

*Because:* You have declined to pursue your researches on the side-lines of the social turmoil or sound-proof your laboratory from the cries of the street, but have manifested a living sense of the social implications of all science, erasing in your own person the frontier between the physical sciences and the social sciences in unique awareness that physics is quite as social as sociology.

*Because:* Despite the draft that public service is making upon your energies, you compel us to speak of your research in the present tense.

*Because:* At the behest of the President of the United States, your disciplined judgment has been brought to bear freely and fruitfully upon the crucial problem of the relation of science to government.

I am happy to confer upon you, in the name of the University of Wisconsin, its honorary degree of Doctor of Laws.

##### ALBERT RUSSELL MANN

*Because:* You brought an adequate science and an active social sense to the enrichment of the content and methods of agricultural education alike in the United States and in Europe.

*Because:* You have contributed and are contributing

a stimulating leadership to the development of soundly progressive policy in the Association of Land Grant Colleges and Universities.

*Because:* Your captaincy of the New York State College of Agriculture gave breadth and depth and reach to its service in the life of that commonwealth.

*Because:* You have displayed extraordinary genius in driving fundamental research and practical application

abreast without soiling the purity of research or slowing down the process of practical utilization.

*Because:* As Provost of Cornell University, you are sharing in the guidance of a great university through the mazes of social and economic change.

I am happy to confer upon you, in the name of the University of Wisconsin, its honorary degree of Doctor of Laws.

## SCIENTIFIC NOTES AND NEWS

ON the occasion of his eighty-fourth birthday, Dr. Herman L. Fairchild, professor of geology at the University of Rochester from 1888 until his retirement as emeritus in 1920, presented the university with his portrait, painted by H. F. Fisher. The portrait is hung at the left of the main loan desk in the Rush Rhees Library.

THE *Quarterly Journal of the Royal Meteorological Society* for April, 1934, is a special "Shaw Number," in honor of Sir Napier Shaw's eightieth birthday.

PROFESSOR A. O. LEUSCHNER, chairman of the department of astronomy in the University of California and director of the students' observatory, has been elected a foreign member of the Royal Physiological Society at Lund, Sweden, in the section for astronomy. Membership in the section from countries other than Sweden is limited to five.

DR. ERNST KÜSTER, professor of botany at the University of Giessen, has been elected an honorary member of the Royal Microscopical Society, London.

DR. HANS FISCHER, of the University of Munich, has been elected an honorary member of the Society of Physical Chemistry at Madrid.

THE honorary degree of doctor of science has been conferred by Tulane University upon Dr. Isaac Monroe Cline, of the U. S. Weather Bureau at New Orleans. Dr. Cline was presented for the degree by Dean Edward A. Bechtel, of the College of Arts and Sciences, with the following citation: "In behalf of the College of Arts and Sciences I have the very great honor and privilege of presenting as a candidate for the degree of doctor of science a man who has faithfully and loyally served the Federal Government and the Nation for a period of more than a half century; a scientist of high achievement in the field of meteorology; the author of standard works on tropical cyclones; a contributor to the science of medicine in his studies of climate and health; a man whose civic spirit has won him the esteem and affection of this city and this state—Dr. Isaac Monroe Cline."

PROFESSOR TIFFENEAU, Paris; Professor W. Straub, Munich, and Professor Heubner, Berlin, were elected

honorary members of the British Pharmacological Society at the recent Oxford meeting. At its first meeting, held a year ago, Professor John J. Abel, of the Johns Hopkins University, and Professor Hans Horst Meyer, of the University of Vienna, were elected honorary members.

THE governing body of the Imperial College of Science and Technology, of the University of London, has elected to Imperial College fellowships the following old students of the college: Sir Alfred Chatterton, consulting engineer, formerly of Bangalore, India; Dr. William H. Eccles, consulting surgeon to St. Bartholomews Hospital, London; Dr. C. Lloyd Morgan, professor emeritus at the University of Bristol, vice-chancellor and for twelve years principal of the college, and Dr. William J. Sollas, professor of geology and paleontology at the University of Oxford.

AT the annual reunion of the Alumni Association of the College of Medicine of the University of Cincinnati on June 14, tribute was paid to Dr. Arthur C. Bachmeyer, who has resigned as dean of the college. Dr. Martin H. Fischer presented a silver coffee service to Dr. Bachmeyer on behalf of his colleagues at the college and the Cincinnati General Hospital. Other speakers were President Raymond Walters, of the university, Drs. William M. Doughty and Fred Heinold. Dr. David Riesman, Philadelphia, was the guest speaker. His subject was "Medical Progress in One Generation."

DR. HAIM I. DAVIS, professor of psychiatry at the University of Illinois College of Medicine since 1926, has retired with the title of professor emeritus.

DR. EDWARD S. WEST, associate professor of biochemistry at the Washington University Medical School, St. Louis, has been appointed head of the department of biochemistry at the University of Oregon Medical School, filling a vacancy caused by the death of Dr. Howard D. Haskins.

DR. EDWARD B. SHAW has been promoted to be associate clinical professor of pediatrics at the University of California Medical School, San Francisco.

RECENT promotions at Dartmouth College include

the following: from assistant professor to professor, Charles J. Lyon, botany; Fletcher Low, chemistry; Harold M. Bannerman, geology; Louis C. Mathewson, mathematics; from instructor to assistant professor, Richard H. Goddard, astronomy, and F. W. Perkins, mathematics.

DR. ROBERT J. D. GRAHAM, of the department of botany at the University of Edinburgh, has been appointed professor of botany at the University of St. Andrews.

DR. ARCHIBALD WILSON HARRINGTON has been appointed to the Muirhead chair of medicine at the University of Glasgow in succession to Professor Walter K. Hunter, who will retire in September.

FRED W. MORRELL, assistant forester in the Forest Service, will have administrative charge of the new Great Plains shelterbelt project.

WILLIAM L. SAMPSON, assistant professor of biologic sciences at the College of Pharmacy at Rutgers University, has been appointed to the research staff of Merck and Company, Rahway.

APPOINTMENTS of research associates in oceanography at the University of California Scripps Institution of Oceanography for the year beginning July 1 are: Drs. Easter E. Cupp, phytoplankton; M. W. Johnson, zooplankton; G. W. Marks, physiology; E. H. Myers, foraminifera; E. M. Thorp, marine sediments, and N. A. Wells, physiology of fishes; for the summer of 1934 and the last half of June, 1935, Professor Burt Richardson, physics, of Occidental College. Research assistants for the year are Messrs. R. H. Fleming, chemistry, and Roger Revelle, marine sediments.

THE British Secretary of State for the Colonies has appointed A. C. Miles, provincial superintendent of agriculture, to be deputy director of agriculture on the Gold Coast.

DR. CLARENCE E. MCCLUNG, professor of zoology and director of the laboratory of zoology at the University of Pennsylvania, who for the past year has been Rockefeller visiting professor at the Keio Medical School in the University of Tokyo, is returning to America by way of Java and Ceylon.

DR. C. F. MARBUT, chief of the division of soil survey of the Bureau of Soils of the U. S. Department of Agriculture, who was recently appointed honorary professor of soils at the University of Missouri, will leave at the end of August for a conference on soils in Barcelona, after which he will participate in an excursion of soil specialists over the Spanish peninsula and part of north Africa. He plans later to spend a few months as adviser on soils to the Geological Sur-

vey of China, returning to the United States in the spring, after having spent some time in India.

DR. ANCEL B. KEYS, formerly research assistant at the Scripps Institution of Oceanography, and now a member of the staff of the Harvard University Fatigue Laboratory, will lead an expedition to the high mountain country north of Kashmir, India, during the spring and summer of 1935. The purpose of the expedition is to study body changes of man and animals at various altitudes ranging from sea level to heights greater than 20,000 feet. The base camp will be established at about 17,500 feet.

PROFESSOR RICHARD GOLDSCHMIDT, of the Kaiser Wilhelm Institute for Biology, Berlin-Dahlem, is expected to visit several universities in Spain during the month of August to give lectures on genetics. He will return to Berlin in September.

DR. ARVID WALLGREN, professor of pediatrics and chief of the Children's Hospital at Gothenburg, Sweden, delivered the Theodore B. Sachs Lectures on tuberculosis at the University of Illinois College of Medicine, on June 6 and 7. These lectures were established at the college for a five-year period by the Chicago Tuberculosis Institute.

DR. GUNNAR NYSTROEM, professor of surgery at the University of Upsala, Sweden, will give the fourth series of Abraham Flexner Lectures in February and March, 1935, at the Vanderbilt University School of Medicine.

DR. L. W. HACKETT, assistant director of the International Health Division of the Rockefeller Foundation, has been appointed Heath Clark lecturer at the University of London for 1934, the lectures of Professor Karl Pearson having been postponed to next year.

*Nature* states that the fifty-third annual meeting of the Society of Chemical Industry was held at Cardiff, from July 16 to 20, under the presidency of Dr. J. T. Dunn. The presidential address, entitled "Science and Industry—the Fertility of Ideas," was delivered on July 17. Other addresses included: Professor H. Freundlich, on "Plasticity the Servant of Industry"; Sir Harry McGowan, to whom the Messel Memorial Medal was presented, on "The Uneven Front of Research," and Colonel C. H. Bressey, on "British Roads Development during the Past Fifteen Years."

THE twelfth International Veterinary Congress will be held in New York at the Waldorf-Astoria from August 13 to 18, under the presidency of Professor E. Leclainche, Paris.

THE Genetics Society of America will hold a meet-

ing at the Marine Biological Laboratory, Woods Hole, Mass., late in August.

THE thirty-sixth annual meeting of the Medical Library Association was held in Baltimore, Md., from May 21 to 24, under the presidency of Miss Marcia C. Noyes, librarian of the Medical and Chirurgical Faculty of the State of Maryland. The following officers were elected for 1934-35: *President*, Mr. Charles Frankenberger, librarian, Medical Society of the County of Kings and Academy of Medicine of Brooklyn, N. Y.; *Vice-president*, Miss Louise Ophüls, librarian, Lane Medical Library, San Francisco, Cal.; *Secretary*, Miss Frances N. A. Whitman, librarian, Harvard University Schools of Medicine and Public Health; *Treasurer*, Miss Mary Louise Marshall, librarian, Tulane University Medical School; *Chairman, Executive Committee*, Miss Marjorie J. Darrach, librarian, Medical Science Department, Detroit Public Library; *Editor of the "Bulletin,"* Mr. J. C. Harding, librarian, Cleveland Medical Library Association; *Manager of Exchange*, Miss Ella B. Lawrence, librarian, Washington University School of Medicine. The next annual meeting will be held in Rochester, N. Y., in June, 1935.

A CONFERENCE on tree ring studies was held on June 11 and 12, 1934, at the Museum of Northern Arizona at Flagstaff, under the chairmanship of Dr. A. E. Douglass, of the University of Arizona. The following institutions interested in dendro-chronology were represented: The Carnegie Institution of Washington, the University of Arizona, Gila Pueblo, Laboratory of Anthropology and the Museum of Northern Arizona. The representative from the University of New Mexico was unable to attend. Among the problems of the science discussed was the need of a journal in which to publish the original data on which climatological conclusions and prehistoric dates are based. It was, therefore, decided to publish a quarterly called the *Tree Ring Bulletin*. Dr. A. E. Douglass will be editor-in-chief; Dr. Waldo S. Glock, assistant editor; Dr. Harold S. Colton, managing editor, and Mr. John C. McGregor, assistant managing editor. Plans call for a July number to appear in a few weeks. While the publication will be of immediate interest to archeologists, it will also deal with problems of climatology and other subjects to which tree-ring studies are related.

WHILE the State Geological Survey of West Virginia is theoretically also a biological survey little or no biological work has been done. At its last annual meeting the West Virginia Academy of Science voted to organize and sponsor a biological survey of the state, and the biological section of the academy appointed a committee made up of H. W. Shawhan, state forester; A. B. Brooks, Oglebay Park naturalist, and a biologist from each college in the state to work out details and have charge of the work. Representatives of the colleges are: Marshall, Frank Gilbert; West Virginia Wesleyan, J. E. Judson; Davis and Elkins, S. Benton Talbot; Salem, H. D. Bond; Bethany, B. R. Weimer; Fairmont, C. M. Roberts; Glenville, E. R. Grose; Concord, E. Meade McNeill; University, L. M. Peairs; Potomac State, R. C. Patterson; Shepherd, G. H. Bretnall; Morris Harvey, C. L. Shilliday; West Liberty, J. E. Drummond; W. Va. State College, A. P. Hamblin, and New River State, E. W. Seyster. Dr. Albert M. Reese, of the University of West Virginia, has been appointed chairman. For the present the academy will be the agent of publication. After the work gets well under way it is hoped that adequate appropriations may be secured from the state. The University of West Virginia will be the repository for all collections and publications relating to the survey. The Bureau of Biological Survey of the U. S. Department of Agriculture has promised to cooperate. All those having material of value to the survey are urged to communicate with the chairman or some other member of the committee, and any one wishing to make use of the material that may be brought to Morgantown is invited to do so.

THREE bird sanctuaries are to be established on the shores of the Central Park, New York City, lakes, which it is expected that thrushes, warblers, nuthatches and other small birds will use as a resting place in their spring and fall migrations. In addition, a number of lakes in the other four boroughs will be stocked next year with fish hatched in the park. The largest of the bird sanctuaries will be on the Harlem Mere at the north end of Central Park. A 1500-foot log boom will keep boats, still to be allowed on the lake, away from the shore of the peninsula there. This retreat will be reserved especially for pheasants and migratory birds.

## DISCUSSION

### HOW SOME BIRDS SATISFY THIRST

IN the March 24, 1934, issue of the English journal *Nature*, Seton Gordon has remarked upon the drinking habits of the birds. This is a subject of much interest. While birds in humid well-watered regions

probably find sufficient water at hand for their needs, in very arid regions and in periods of extreme winter cold, water may not be readily available.

Some of the desert birds appear to be little worried by the absence of a ready supply of drinking water.

Dr. C. B. Ticehurst and Major R. E. Cheesman in their paper "The Birds of Jabrin, Jafura, and Hasa in Central and Eastern Arabia and of Bahrain Island, Persian Gulf," published in *Ibis*, 12th series, Vol. 1, No. 1, January, 1925, say of the lark *Alaemon alaudipes cinerea* (Zar.):

It would seem to be one of those species which has solved the problem of life without drinking, for it was met with as much as seventy miles away from the nearest well, though it is possible that occasional morning mists and dew observed in the sand-dunes would enable it to take drops of moisture from the bushes; however, it must be able to exist for long periods without drinking, and it was never seen at wells or water-holes, a fact which one of us noted also in the Sind desert.

Nestling birds, obviously, are unable to get water, except as it comes to them. It is possible that show-ers may at times wet the rim of exposed nests sufficiently to allow them to secure water droplets.

Mr. Meade Waldo appears to have been the first to describe a unique method by which the young of the sand grouse *Pteracles* kept in his aviaries sometimes obtain water, publishing his observations in "The Zoologist" (1896, p. 299). His observations would indicate that water is actually conveyed to the young, and by the male alone. He says, "The male rubs his breast violently up and down on the ground—a motion quite distinct from dusting—and when his feathers are awry gets into his drinking water and saturates the feathers of his underparts. When soaked he goes through the motions of flying away, nodding his head, etc.; then, remembering his family is close by, he would run to the hen, make a demonstration, and when the young run out, get under him, and suck the water from his breast." He states that it appeared like a mammal suckling its young and "The young pass the feathers through their bills, and keep changing places until the supply becomes exhausted. Until the young can fly they take water in no other way, and the cock gives it to the young only."

Dr. Glover Allen in his book, "Birds and Their Attributes," has seen pine siskins in the far north eating snow, and he once watched a flock of cedar wax-wings flying into the air to catch snowflakes as if they were insects.

I may state that the introduced starling, with its remarkable ability to meet most situations successfully, seems to worry little about the presence of water in winter-time. For several years I have had these birds nesting in a box close to my bedroom window, and on many occasions I have observed them eating snow heartily where it had lodged upon the top of their box which they frequented throughout the winter.

Several times, both at Clarendon, Va., and at Wash-

ington, D. C., I have seen them in numbers during snowstorms, flying back and forth engaged in catching snowflakes. However, I have seen them engaged in the same aerial activities in summer-time to catch ants and other insects swarming in the air. Whether the birds are actually catching the flying snowflakes because they are thirsty or whether they may have thought they were flying insects, I do not know. The habit of eating snow is surely to satisfy thirst or the needs of the body for water.

H. A. ALLARD

U. S. DEPARTMENT OF AGRICULTURE

### SELENITE NOT A CERTAIN INDICATOR OF WIND EFFECT<sup>1</sup>

SCHOEWE and Bryan<sup>2</sup> have suggested that selenite fragments having etched surfaces could be used as criteria for wind action because selenite readily becomes frosted when treated with the sand blast in the laboratory.

In Eddy County, New Mexico, and in Reeves and Culberson Counties, Texas, the upper Permian formations are upturned and truncated, and massive anhydrite beds, exposed to weathering, are altered to gypsum, which covers wide expanses of territory. Although gypsum is one of the less common products of sedimentation, it has thus become the most conspicuous rock in this northwest sector of the Delaware Basin.

Anhydrite alters to various types of gypsum. Selenite, a variety of gypsum, occurs often as large crystals. It is most abundant in lake bed deposits or on playas, or along exposures in bluffs where crystals 1 to 2 feet in length are not uncommon. In the vicinity of Salt Draw, some twenty miles south of Carlsbad, New Mexico, a bed of selenite enclosed in redbeds crops out across the old highway and the railroad right of way. The excavation for the track was made in 1891, and the material thrown aside has remained virtually undisturbed since then. The writer has passed this outcrop many times in a period of ten years; and he has had opportunity to make numerous field observations. He was originally attracted to this outcrop by the brilliant scintillating reflections of sunlight from the shining surfaces of the selenite.

At this locality selenite crystals perched on small prominences and fully exposed to the wind have retained enough of their original brilliance to look as if they had new cleavage faces. Examination, however, shows their surfaces to be the product of natural weathering in a region where the average annual rain-

<sup>1</sup> Published by permission of the Director of the U. S. Geological Survey.

<sup>2</sup> W. H. Schoewe and Kirk Bryan, "Selenite Fragments or Crystals as Criteria for Wind Action," *SCIENCE*, 72: 1859, 169-70, August 15, 1930.

fall is 15 inches and the winds in spring often are of sufficient intensity and persistence to scour out cotton fields to the depth of a foot in a few hours and to drive quarter-inch pebbles through the air. The preservation of the selenite in Salt Draw is due not to the absence of wind action but rather to the lack of tools sufficient to make wind action effective. The character of the material available to the wind at any given place is dependent upon the composition of the terrain over which it blows, as is readily shown by a comparison of the color of the material transported by storms. The prevailing westerly winds sweeping down the Sacramento cuesta fill the air with dust of a sickly yellowish hue, acquired from the limestone and gypsum surfaces over which they have swept; whereas winds from the same direction crossing the Pecos River and moving eastward into Texas become, when violent, a coffee-brown, because they are laden with fine sand and redbed silt.

Bright selenite fragments may indeed serve to indicate the local ineffectiveness of wind action in isolated or protected places, but they also suggest a scarcity of abrasive material in the windswept terrain. Certainly, they do not prove the absence of wind action or that the selenite fragments have been so recently broken as to present fresh cleavage surfaces. On the other hand, selenite crystals that have grown in earthy ground may contain diffused impurities that give the selenite a frosted appearance, which on insufficient observation may be mistaken for wind scouring.

The appearance of selenite crystals may lend some support to other criteria in judging the nature of wind action at a given place, but as selenite is a sensitive indicator, deductions from it may prove erroneous. Caution should therefore be exercised in applying to the geomorphological history of an area interpretations based on the presence and appearance of selenite.

WALTER B. LANG

#### ON A WHALE SKELETON IN THE COLLECTIONS OF THE CALIFORNIA ACADEMY OF SCIENCES

IN his recent article on a blue whale skeleton in the British Museum, Mr. F. C. Fraser<sup>1</sup> states regarding the specimen he has under consideration that it is: "... almost certainly the largest articulated skeleton in any Museum in the world. The only exception to this statement may possibly be in the Museum at Buitenzorg, Java, where there is a skeleton of a whale 27.8 meters in length, but I do not know whether it is articulated."

The specimen in the British Museum yielded the following measurements: total length about 82 feet;

<sup>1</sup> *Nat. Hist. Mag.*, 4: 30, 228-230, 1934.

length of flippers 10½ feet; width of flippers 2½ feet. The dorsal fin was 11 inches high and 28 inches long. The tail measured 16 feet across its outer edge. The blubber was rather tough and not very rich; it was from 10 to 4 inches thick on the back.

In view of this record it may be worth publishing the measurements of an articulated specimen of a male blue whale (*Sibbaldus musculus*)<sup>2</sup> in the collections of the California Academy of Sciences, San Francisco, California. This specimen was taken off the west coast of Vancouver Island in 1908, by the whaler *St. Lawrence*, operating from the Pacific Whaling Company's station at Kyuquot, British Columbia. In the flesh this whale measured 87 feet; and from it was obtained 60 barrels of oil, 8 tons of fertilizer and 400 pounds of baleen. The skeleton measures: Length, 75 feet; head (total length), 20 feet 6 inches; mandible, 19 feet; fore flipper, 10 feet 10 inches; longest rib, 10 feet 4 inches.

M. E. DAVIDSON

CALIFORNIA ACADEMY OF SCIENCES

#### A NEW MAMMOTH RECORD FOR ILLINOIS

A RECENT acquisition of Pleistocene mammal material in the Museum of Natural History of the University of Illinois appears to be worthy of record. It consists of the lower jaw with teeth intact and two upper first molars. The lower molars represent the third milk teeth, which had cut through the gums and had been used. The upper molars are the third milk teeth, but they had not cut through the gums when the baby elephant died, the crowns being wholly unworn. The animal was apparently about six years of age, as compared with the recent elephant.

The location from which the skeletal material came is situated about eight miles southwest of Paris, Edgar County, Illinois. The deposit is gravel, representing, probably, outwash from the Shelbyville moraine of the Wisconsin glacier. The teeth and jaw were on top of the clay, evidently the Illinoian till, at the base of the gravel and at a depth of 10 or 12 feet below the surface. The animal, therefore, lived in the Sangamon interglacial interval. The specimen belongs to the hairy mammoth species, *Elephas primigenius boreus* Hay.

During the work of the CWA in Illinois many reports of elephant finds were recorded in the newspapers, but few of these appear to have gotten into scientific journals. It is to be regretted that these finds were not permanently preserved in some of our museums. It is probable that two species of *Elephas* and one of *Mastodon* or *Mammut* were represented.

FRANK C. BAKER

UNIVERSITY OF ILLINOIS

<sup>2</sup> *Vide* Miller, *U. S. Nat. Mus. Bull.*, No. 128, p. 506, 1924.

## THE FIFTEENTH ANNUAL MEETING OF THE AMERICAN GEOPHYSICAL UNION

THE fifteenth annual assembly of the American Geophysical Union and the meetings of all its sections were held on April 26, 27 and 28, at Washington, D. C., in the building of the National Academy of Sciences and National Research Council. The western meeting of the Section of Hydrology was held on June 20 and 21, in Berkeley, California, where the University of California generously provided a meeting place.

The reports and papers presented at the fifteenth general assembly were concerned largely with progress in development of the U. S. Weather Service in line with the recent recommendations of the Science Advisory Board in relation to studies of movements of major air-masses and the use of aerological observations in weather forecasting. Included also were a number of reports on the upper-air data obtained during the International Polar Year of 1932-33. As a matter of record, a short report on the fifth general assembly of the International Union of Geodesy and Geophysics is being added in the two volumes of *Transactions* of the meeting now in press upon request of the executive committee.

Several papers presented to the Section of Geodesy related to geodetic and gravimetric work in Canada, Mexico and the United States. Other papers were devoted to the determination of longitude as a part of the international program of 1933, to instrumental developments and to the effect of the moon's position on observed clock corrections.

The Section of Seismology heard progress-reports from the U. S. Coast and Geodetic Survey and the Jesuit Seismological Association, on installations of tilt-meters and on first-order leveling as an aid in seismological research. Several papers reported on the earthquake of September 6, 1933, and its bearing on the problem of the deep earthquake, on weathering correction, on values for dilatational wave-velocities and on quarry-blasting. A paper by our Mexican colleague, Dr. Sánchez, told of the relation of the Bay of Acapulco to earthquakes in southern Mexico.

Several papers submitted to the Section of Meteorology reported on the reorganization of ocean weather-records for new applications and of climatological, aerological and river-gage data made possible by the Civil Works Administration and Public Works funds. Mountain meteorology and its history were covered in several important contributions. Sounding-balloon work and aerological studies of the International Polar Year program were reported. Other papers dealt with the surface of subsidence,

atmospheric ionization near the ground during thunderstorms and lightning-discharges.

In the Section of Terrestrial Magnetism and Electricity, Dr. Schonland of South Africa spoke on the study of atmospheric electricity there. Several papers were given on atmospheric-electric and auroral and earth-current observations of the International Polar Year in Alaska and Canada. Señor Sandoval reported on magnetic secular-variation and Captain Heck reviewed problems of magnetic surveys. One paper dealt with the effect of magnetic activity upon secular-variation. Three papers were concerned with cosmic radiation and with ozone-measures. In the radio field four papers were presented on atmospherics, on radio-transmission studies in geophysical investigations, on the aid of radio in geological mapping and on relation of radio with earth-potential observations. Dr. Kaplan presented an account of the production of the auroral spectrum in the laboratory. Progress-reports of nine organizations were received, and a brief report of the Lisbon meeting of the International Association was made.

Progress-reports were made to the Section of Oceanography for the Hydrographic Office, the International Ice Patrol, the Coast and Geodetic Survey, and regarding work in the Russian Arctic, while the Committee on Oceanographic Activities in North America covered the work of other institutions on the Pacific and Atlantic sides of Canada and the United States. Two papers dealt with surface temperatures and with temperature-salinity correlation.

In the Section of Volcanology a fine series of papers was concerned with the rare chemical constituents, the thermal decomposition of some carbonate minerals, geyser-basins, volcanic dust in relation to climate, the rôle of volatiles in titanium deposits, the year's volcanic activity, the viscosity of magmas and basaltic flows.

The Section of Hydrology held three sessions in Washington and several sessions in Berkeley. The annual reports of the nine permanent committees on research as presented at Washington are being published in the *Transactions*. Twenty-eight papers at Washington and fourteen papers with discussions at Berkeley evidence the wide interest in hydrological research and its economic importance. In conjunction with the meetings in Berkeley there was held also the annual meeting of the Western Interstate Snow-Survey Conference.

In view of the many contributions from the Section of Hydrology and from the Snow-Survey Conference, and to facilitate wider distribution, the

*Transactions* of the meetings of 1934 are being published and bound in two parts. Part I includes proceedings of the fifteenth general assembly and those of the Sections of Geodesy, Seismology, Meteorology, Terrestrial Magnetism and Electricity, Oceanography and Volcanology at Washington, while Part II is devoted to proceedings of the Section of Hydrology at Washington and at Berkeley, including those of the Snow-Survey Conference.

The following six resolutions were unanimously adopted at the general assembly:

*Resolution on auroral observations at College, Alaska,* proposed by the Section of Terrestrial Magnetism and Electricity:

WHEREAS, On November 8, 1929, the Rockefeller Foundation appropriated the sum of \$10,000 to establish, equip, and maintain a first-order auroral station at College near Fairbanks, Alaska, to carry out a five-year program of research on the aurora, and

WHEREAS, This work has been carried out successfully since 1930 under the efficient direction of Professor Veryl R. Fuller, of the Alaska Agricultural College and School of Mines, is giving results of great value in the systematic study of auroras, and constituted an important link in the chain of Polar Year stations, and

WHEREAS, This station is in a particularly desirable location, not only from the favorable surroundings, but because it is practically 180° distant in longitude from the first-order station in Norway, therefore be it

*Resolved*, That the American Geophysical Union expresses the hope that means will be found to continue the operation of this station beyond the five-year period for which provision was made, and be it further

*Resolved*, That a copy of this resolution be sent to the President of the Alaska Agricultural College and School of Mines and to the Rockefeller Foundation.

*Resolution regarding Carte Bathymétrique Générale des Océans*, proposed by the Section of Oceanography:

*Resolved*, That the American Geophysical Union expresses its appreciation of the efforts which are being made by the International Hydrographic Bureau towards the publication of a revised edition of the *Carte Bathymétrique Générale des Océans*, declares its sense of the value which such publication would render to the science of Oceanography, and hopes that the publication will not be unduly delayed by lack of financial resources, and be it further

*Resolved*, That a copy of this resolution be sent to the International Hydrographic Bureau.

*Resolution on the death of Henry Stephens Washington:*

WHEREAS, In the death of Henry Stephens Washington on January 7, 1934, the American Geophysical Union lost one of its original members, who served successively as Chairman of the Section of Volcanology, Chairman of the Section of Geophysical Chemistry, and Vice-Chairman and Chairman of the Union, and

WHEREAS, Dr. Washington made notable contributions in the fields of geology, mineralogy, and volcanology,

particularly in the chemical analysis of rocks, the classification of igneous rocks and studies as to their relation to volcanic activity, and the constitution of the interior of the Earth, therefore be it

*Resolved*, That the American Geophysical Union records this expression of its sense of great loss in his death, and be it further

*Resolved*, That a copy of this resolution be sent to Dr. Washington's family, to the President of the Carnegie Institution of Washington, and to the Director of the Geophysical Laboratory.

*Resolution on the death of William Morris Davis*, proposed by the Section of Oceanography:

WHEREAS, In the course of a long and distinguished career, William Morris Davis made notable contributions to oceanography as well as to meteorology and the explanation and classification of land forms, and

WHEREAS, In particular, he brilliantly analyzed the evidence presented by coral reefs as to Pleistocene and recent changes in sea-level, therefore be it

*Resolved*, That the American Geophysical Union expresses its deep regret at the death of Professor Davis on February 5, 1934, and honors the memory of one who so greatly advanced human understanding of the oceans, the atmosphere, and the forms of the Earth's surface, and be it further

*Resolved*, That a copy of this resolution be sent to Mrs. Davis, to the President of Harvard University, and to the Chairman of the Administrative Board of the California Institute of Technology.

*Resolution on the death of Fred Forbes Henshaw*, proposed by the Section of Hydrology:

WHEREAS, In the death of Fred Forbes Henshaw on December 26, 1933, the American Geophysical Union has lost a member who has long been active in hydrologic studies, and

WHEREAS, He has contributed largely to the observations and interpretations of hydrologic phenomena and to the literature of hydrology and hydraulics, therefore be it

*Resolved*, That the American Geophysical Union expresses its sense of great loss through his death, and be it further

*Resolved*, That a copy of this resolution be sent to Mr. Henshaw's family.

*Resolution on the death of Floyd August Nagler*, proposed by the Section of Hydrology:

WHEREAS, By the death of Floyd August Nagler on November 10, 1933, the American Geophysical Union has lost one of its most active and productive workers in the field of experimental hydraulics, and

WHEREAS, He rendered outstanding service in the upbuilding of the hydraulic laboratory of the University of Iowa and in promoting research in the fields of hydrology and hydraulics, therefore be it

*Resolved*, That the American Geophysical Union expresses its sense of great loss through his death, and be it further

*Resolved*, That copies of this resolution be sent to

Professor Nagler's family and to the President of the University of Iowa.

The meetings and the papers presented illustrate the increasing interest in, and value of, the scientific

and practical applications and contacts of geophysics—both nationally and internationally.

JNO. A. FLEMING,  
General Secretary

## SCIENTIFIC APPARATUS AND LABORATORY METHODS

### A SIMPLE AGITATOR FOR SUBMERGED RESPIROMETERS

SOME time ago there arose in our laboratory the need for a suspending, controlling and agitating device for a set of Barcroft respirometers of the type described by R. W. Gerard.<sup>1</sup> The device designed for this laboratory and now being used in it is illustrated in representative sections in the accompanying

can be made in duplicate for use on both sides of a large bath and activated by means of the same pulley system. The cost of the apparatus, excluding the motor and the manometers, is less than \$5 and the simplicity of the design renders skilled labor and special tools unnecessary in its construction.

H. SPECHT

THE JOHNS HOPKINS UNIVERSITY

### A STAIN FOR DIFFICULT PLANT MATERIAL

RECENTLY some plant material has been encountered which could not be satisfactorily stained by the ordinary procedure. The following version of the Flemming triple stain was worked out for this material and is now being used for most of the cytological work at this laboratory.

#### Proportions:

- 1 part—1 per cent. aqueous gentian violet
- 2 parts—1 " " " safranin
- 1-4 " —distilled water

**Schedule:** If a fixative with no chromic acid has been used, slides are soaked in 1 per cent. aqueous chromic acid from one hour to over night, and rinsed through several changes of tap water. They are stained 1 to 24 hours—depending on strength of stain. A dilute stain over a period of 24 hours gives the best results. They are then washed in tap water. Thereafter they are placed for 30 seconds in 1 per cent. iodine-potassium-iodide in 70 per cent. alcohol and washed a few seconds in each of the following:

- 50 per cent. alcohol (two jars in series)
- 70 " " "
- 95 " " " plus picric acid (about 1 gm per 100 cc)
- 95 " " " " ammonia (8-10 drops per 100 cc)
- 95 " " "
- 100 " " "
- clove oil plus orange G (0.2 gm per 100 cc)
- " " clear
- xylol (three jars in series)

The slides may be examined in xylol. Excess safranin may be removed by returning the slide to 100 per cent. alcohol, then back to xylol. Excess gentian violet may be removed by returning the slide to clove oil, then back to xylol.

This stain is extremely selective. Chromosomes in different stages of development take up varying shades of color, usually from light to dark purple.

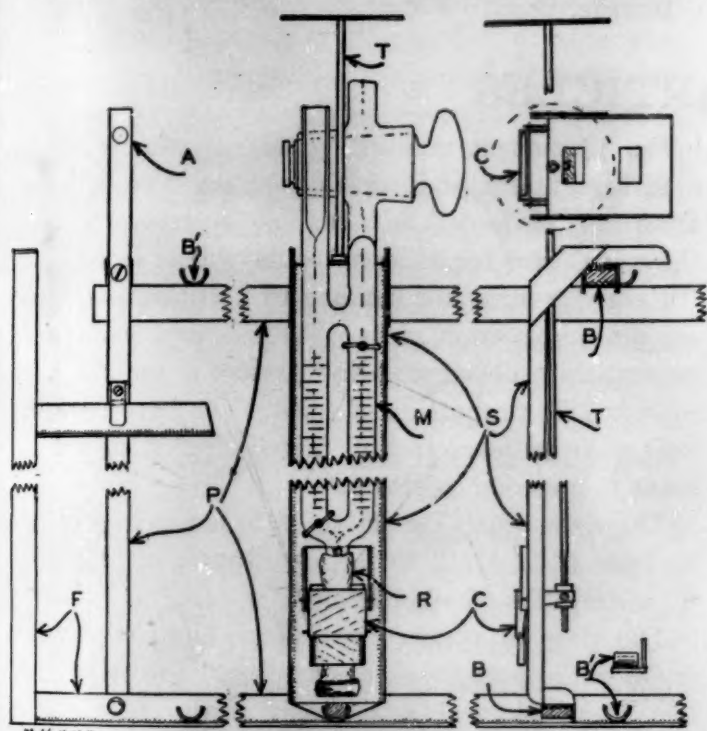


FIG. 1.

figure. Essentially, the hanger for each manometer consists of a strap of metal (S) bent into the shape of an inverted L and properly braced so as to support the glass structure of the manometer (M). A two-piece clamp (C), actuated from above by a threaded rod (T), compresses the manometer reservoir (R) at the lower end of this hanger. The latter has two bearings (B) by means of which it is suspended on the agitating device. These bearings fit into corresponding cup bearings (B') on the agitating device and permit the removal and replacement of each individual hanger without disturbing the others. The agitating device is essentially a U-shaped frame (F) the sides of which guide, and the lower member of which supports the other three parts of a jointed parallelogram (P) upon which the manometers are rocked in unison. This parallelogram is moved by means of a crank and pulley system connected to one of its upper corners (A). This device

<sup>1</sup> *Am. Jour. Physiol.*, 1931.

The spindles become a different shade of purple, the nucleoli red, and the cytoplasm orange-yellow. Anatomical structures are stained the same as with Fleming's triple stain.

PALMER STOCKWELL

CARNEGIE INSTITUTION OF WASHINGTON  
STANFORD UNIVERSITY

### MICRO MOUNTS, REVERSE AND CONVERSE

In examining the reverse side of microscope mounts, at least two procedures have been resorted to. One is to make mounts thin enough on the reverse side to enable clear vision with a high-power objective. Two such types of mounts have been described in a former issue of *SCIENCE*.<sup>1</sup> I have used a similar method, mounting my specimens between two cover glasses, one 25 mm square, the other circles 12 to 20 mm in

diameter. Use of the smaller covers leaves an area on the large cover for recording the collection number. These mounts were examined on a special holder consisting of the usual micro slide to the face of which were soldered three strips enclosing a 25 mm square. These square mounts were filed in shallow trays as used in England.

The chief objection to this method is that it does not provide for the examination of the reverse side of micro slides received for study from *other* persons and institutions scattered over the United States and abroad. For such examination the second method, already described in *SCIENCE*,<sup>2</sup> is necessary, and having adopted this method, the first is quite unnecessary.

ARTHUR PAUL JACOT

MONROE, CONN.

## SPECIAL ARTICLES

### SPONTANEOUS ENCEPHALOMYELITIS OF MICE—A NEW VIRUS DISEASE

DURING the past two years, on numerous occasions, individual mice with flaccid paralysis of the hind legs have been observed among our normal stock. By intracerebral injection of normal mice with a suspension of brain or spinal cord from six affected mice, five strains of the inciting agent have been obtained and propagated in series by passage through mice.

The course of the disease in mice, after intracerebral injection, depends on several factors, of which the strain of the virus and the age of the mice are the most important. The course of the disease, using the strain of virus most extensively studied, is briefly as follows: After an incubation period varying from seven to more than thirty days, a flaccid paralysis of one of the limbs appears. This paralysis usually spreads rapidly until all four limbs are affected. In general it may be stated that the younger the mice, the higher the mortality. Very young mice, less than four weeks of age, usually die without showing signs of paralysis. With increasing age the paralysis rate as well as the mortality rate decreases. Adult mice often show no signs after an intracerebral injection of the virus. A number of these mice, although showing no signs of paralysis, have become infected, a fact which is demonstrated by the results of intracerebral injection of normal mice with a suspension of the spinal cord from these mice, as well as by histopathological studies.

Intranasal instillation of virus is the only other method of producing the infection. This method, however, produces paralysis in only a small percentage of mice. Following intranasal instillation there is often developed a relative immunity to a subsequent intracerebral injection of virus.

The paralysis in surviving mice recedes gradually.

<sup>1</sup> *SCIENCE*, 78: 2021, 267, September 22, 1933.

but a permanent residual paralysis, usually of the hind legs, is almost invariable. Such mice, however, are virus "carriers," as virus can be recovered from the spinal cord for at least 150 days after injection.

Paralytic mice are immune to a subsequent intracerebral injection of virus. There is some evidence of neutralizing substances being present in the blood. A considerable proportion of mice which have remained well after an intracerebral injection of virus are immune to a second injection.

The virus resists the action of 50 per cent. glycerine at from 2° to 4° C. for at least 150 days. It passes all grades of Berkefeld filters with ease.

The virus of spontaneous mouse encephalomyelitis is not pathogenic for rhesus monkeys. No evidence of any immunological relationship with the virus of human poliomyelitis has been obtained.

The anatomic basis for the symptoms is an acute necrosis of the ganglion cells of the anterior horn of the spinal cord. Isolated ganglion cells of the cerebrum also undergo necrosis. Following the acute necrosis of the ganglion cells, there is a marked neurophagia. A perivascular infiltration is observed in the cerebrum and spinal cord. Lesions have been observed only in the nervous system, which is the only region where virus has been demonstrated.

MAX THEILER

LABORATORIES OF THE INTERNATIONAL  
HEALTH DIVISION  
ROCKEFELLER FOUNDATION  
NEW YORK

### RESPIRATORY TYPES AND PHOTO- PERIODISM

Work was initiated in 1930 on the potted apple trees make of carbon (side from unmodified

<sup>2</sup> *SCIENCE*, 78: 2015, 128, August 11, 1933.

<sup>1</sup> Published with the approval of the director of the Agricultural Experiment Station.

air. It has been reported<sup>2</sup> that the internal condition of the plants, due to differences in nitrogen nutrient, variety, stocks, photoperiod, shading and girdling, affected the amount of this gas used per unit leaf area in unit time.

The method employed of recording the amount of carbon dioxide in air that has been passed through a closed chamber containing plants does not measure, obviously, the amount of carbon dioxide which the plants use. For example, girdled trees have an increased respiration rate and appear to give off more carbon dioxide during the night than is taken out of the air during the day. The amount of carbon dioxide removed from the air during the day when respiration is also going on is an apparent low amount and not an actual amount. The carbon dioxide measurements do, however, show the period of its utilization during the day as well as represent the intensity of respiration during the night.

As plants do not extract carbon dioxide from the air at uniform rates during periods of illumination nor discharge it uniformly in periods of darkness, a record of the trend of carbon dioxide exchange can be secured only by determinations at different times throughout the 24 hours of the day or, it seems in some cases, only by observations during consecutive days. Three-hour readings were used in the present studies.

Observations upon 12 species other than *Malus* (6 varieties) particularly selected to represent short-day, long-day and indeterminate types<sup>3</sup> have led to the conclusion that plants have characteristic rhythms or daily cycles of carbon dioxide utilization. It is suggested that this plant character is associated with, if not responsible for, the phenomenon of photoperiodism. The species examined to date have shown a relatively irregular respiration curve for plants in a reproductive growth condition and a more regular curve when in a purely vegetative condition. Thus, short-day plants as *Poinsettia* gave the more irregular curve when grown in a short-day environment and long day plants as spinach had the more irregular curve in a long-day environment. Each type of plant had more regular respiration curves in the environment which produced a vegetative growth response. (That is, if curves showing carbon dioxide exchange may be referred to as respiration curves.)

This correlation of respiration type to reproductive condition appears to bear a significant relation to Wilton's<sup>4</sup> deduction that plants of different photo-

periodic classes have similar anatomical characteristics, particularly in tissues of secondary origin, at the time of flower formation, although they require a different light environment in order to become fruitful.

It should be clearly noted that the present carbon dioxide studies show that the altered respiration values precede flowering and appear as a causal condition rather than an effect.

It appears that the respiration rhythm of a plant may account for the unequal responses which some plants exhibit to added illumination applied at different periods of the day.

In some plants a respiration type which has been established by a cultural treatment tends to persist for a considerable time after the environment has been altered. Tests are being made to determine if the "vernalization" effects described by Lyssenko<sup>5</sup> or such phenomena as the inducing of seeding of celery by chilling in the seedling stage<sup>6</sup> result from an altered and then persistent, respiration type.

R. H. ROBERTS

JAMES E. KRAUS

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#### LINEAR AND DENDRITIC SINK-HOLE PATTERNS IN SOUTHEASTERN NEW MEXICO

SINK-HOLES arranged in straight lines have lately been discovered in the High Plains in the southeastern part of New Mexico. These manifestations of the dissolving action of ground-water range in size from features which are very small to others more than 1,800 feet in diameter. They are connected in places by straight "trenches" of varying depth, which are possibly also the result of solution. The basins possess different degrees of roundness, the larger ones being the more elongate. These straight alignments, extending for 10 or 15 miles, are usually arranged in a parallel series which may be seen at various places throughout a considerable region. In Lea County, in an area as large as a 15-minute quadrangle, the mode of these linear trends is north 64° west. The mean deviation from this value is only a few degrees.

There are two zones of soluble rock and an intervening insoluble layer more than 1,000 feet thick. The upper zone is a thin superficial deposit of interbedded sand and limestone known as "caliche," which is usually 200 feet or less in thickness. In places it is covered by dunes. The lower "bed-rock" zone is a complex mass, consisting of limestone and various

<sup>5</sup> R. O. Whyte and P. S. Hudson, "Vernalization, or Lyssenko's Method for the Pre-treatment of Seed," *Bul.* 9, Imperial Bureaux, Plant Genetics, Great Britain, 1933.  
<sup>6</sup> H. C. Thompson, N. Y. (Cornell) *Agr. Exp. Sta. Bul.* 480, 1929.

<sup>2</sup> Meeting of the American Society of Plant Physiologists, Boston, December 28, 1933.

<sup>3</sup> W. W. Garner, *Plant Phys.*, 8: 347-356.

<sup>4</sup> Oera C. Wilton, "The Relation of Anatomical Structure to Growth and Fruiting Condition in Plants," Doctor's thesis, University of Wisconsin, 1934.

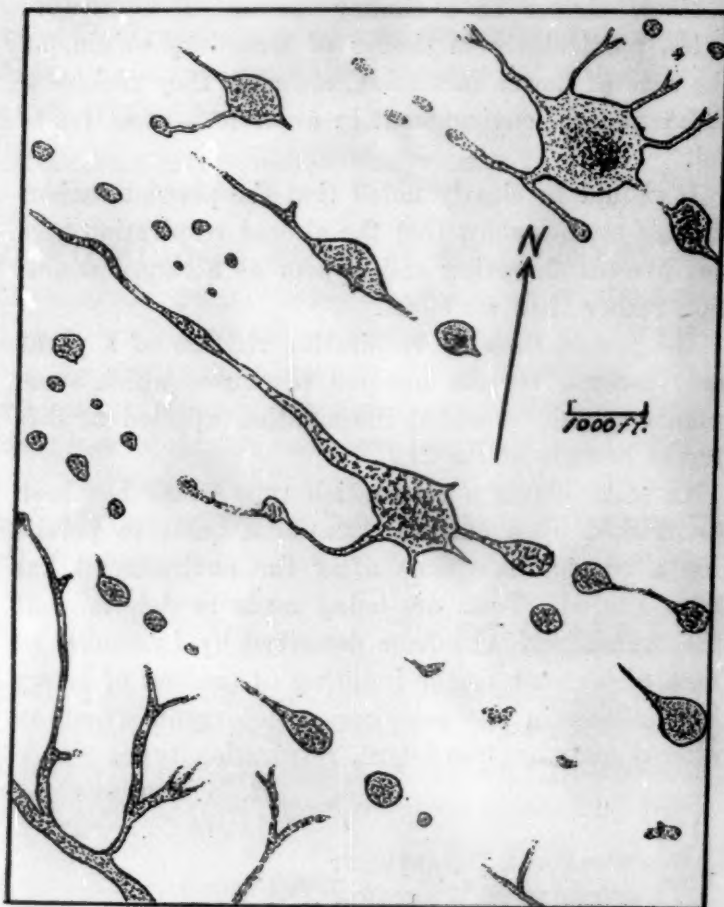


FIG. 1. Sketch made from an aerial photograph illustrating the alinement of sink-holes in southeastern New Mexico. The shaded areas represent surfaces of dark soil.

products formed by the evaporation of marine waters. There follows a list of formations near the southeastern corner of the state:

*Tertiary and Quaternary:*

"Caliche," sand and gravel..... 200 feet  $\pm$

*Triassic and Permian:*

Red shale and sandstone..... 1,200 to 2,000 feet

*Permian:*

Salt and anhydrite ..... 1,000 to 1,500 feet

Limestone and anhydrite ..... 500 to 1,500 feet

The large basins doubtless owe their alinement directly to a system of parallel fractures in the underlying bed-rock. Faults and joints with somewhat similar trend are prominent features in the Yates oil district and at other localities to the southeastward. Some of the smaller sink-holes likewise may be due to the presence of joints in the bed-rock, though in this case there is probably only an indirect connection. For example, straight ravines may have been eroded along these fractures in the Triassic strata before their burial by the Tertiary caliche deposits. Removal of limestone by underground drainage through the hypothetical valleys may thus have formed many small depressions as well as the elongate "trenches" in the present surface. Since the caliche is seldom found to be jointed with an intensity similar to that of the underlying terrane it does not seem probable

that planes of fracture in this superficial formation could have been responsible for such an alinement.

In addition to this linear arrangement, a branching pattern is manifested in some places by groups of connected basins having an average diameter of less than 200 feet. This pattern has doubtless developed through the work of ground-water within the caliche, either as it integrated separate drainage channels into

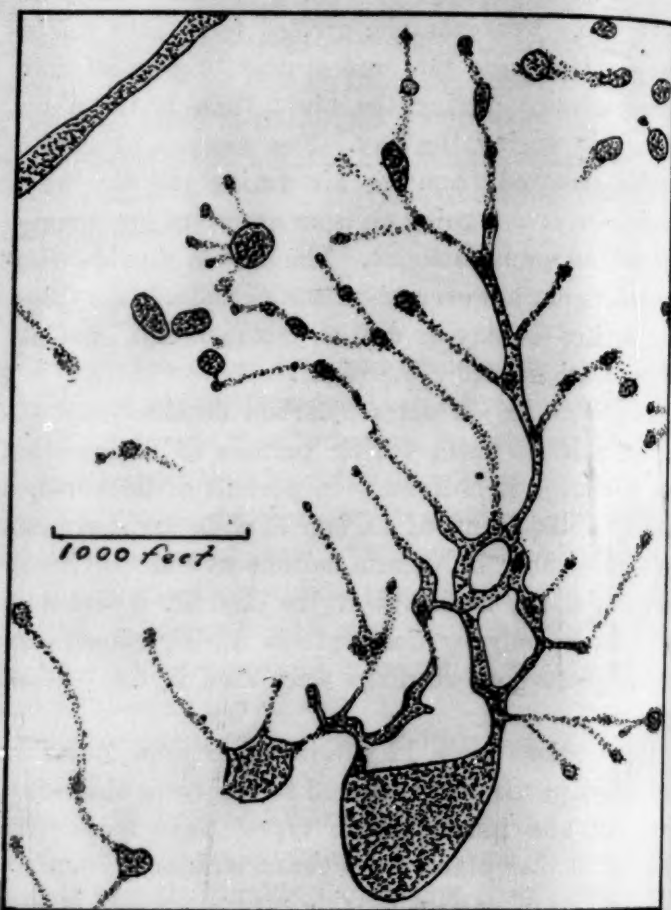


FIG. 2. Sketch made from an aerial photograph illustrating a branching arrangement of sink-holes in southeastern New Mexico. The shaded areas represent surfaces of dark soil.

a connected system, or as it flowed along branching valleys buried beneath the porous Tertiary beds. The available facts are inadequate to test these two alternatives. The writer has seen similar branching patterns in Florida; linear patterns formed by a series of parallel lines, however, are rare in that state as well as in the Mammoth Cave district of Kentucky.

FRANK A. MELTON

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### BOOKS RECEIVED

- CHAMBERLAIN, JOSEPH S. *A Text-book of Organic Chemistry*. Third edition, revised. Pp. xxv + 873. Blakiston's. \$4.00.
- INFELD, LEOPOLD. *The World in Modern Science*. Pp. 287. Illustrated. Minton, Balch. \$2.00.
- MCADIE, ALEXANDER. *Fog*. Pp. 23. 37 plates. Macmillan.
- SHUMAN, JOHN T. *Spelling for Trade and Technical Students*. Pp. 133. Christopher. \$1.25.